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ENDANGERED SPECIES

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Endangered Species Program, Washington, D.C. 20240

Bald Eagle Bicentennial Year Highlighted by Chesapeake Plan

by Roger Hogan, Region 5

The first of five regional recovery plans designed to help reestablish bald eagle *(Haliaeetus leucocephalus)* populations in the United States was signed on May 19, 1982, by the Service's Director Robert A. Jantzen. This plan, the Chesapeake Bay Bald Eagle Recovery Plan, was prepared by the Chesapeake Bay Bald Eagle Recovery Team which is headed by Gary J. Taylor, Nongame and Endangered Species Program Manager for the Maryland Wildlife Administration.

In recognition of Taylor's leadership which was key to the plan's completion, a Letter of Commendation from Director Jantzen was recently presented to him by Regional Director Howard Larsen. During the presentation, Larsen expressed his confidence in the success of recovery efforts for the bald eagle and noted the appropriateness of the Recovery Plan's completion during 1982, recently designated as "Bicentennial Year of the American Bald Eagle" by President Ronald Reagan. The letter also acknowledged Taylor's involvement in the organization and direction of projects for the benefit of Federal and State endangered species in the Chesapeake Bay Area.

Status of Chesapeake Bay Eagles

The Chesapeake Bay Region encompasses the entire state of Delaware and the coastal plain of Maryland and Virginia. In 1936, approximately 25 percent of this area was surveyed resulting in an estimate for that portion of the region of 150 to 200 nesting pairs of eagles. Estimates from a 1962 aerial survey indicated that only 150 pairs of bald eagles remained in the entire Chesapeake region and that the level of production of young by these birds was only one-eighth of that found in 1936. By 1970, the nesting population of bald eagles appeared to have been reduced to 80–90 pairs. The decline in the eagle population has been attributed largely to high levels of pesticides DDE, Dieldrin and also possibly PCB's. Recent data (1982) show an improvement in the number of active nests with 106 counted, and also an increase in productivity. The gradual decline in levels of pesticides in the eagles is beginning to be manifested.

Other problems still exist in the form of other environmental contaminants, accelerating rates of habitat destruction, disturbance, and shooting. The Chesapeake Bay Bald Eagle Recovery Plan sets forth various tasks designated to minimize these impacts on eagles. These tasks range from population and habitat surveys and obtaining cooperative agreements with landowners, to developing public information programs.

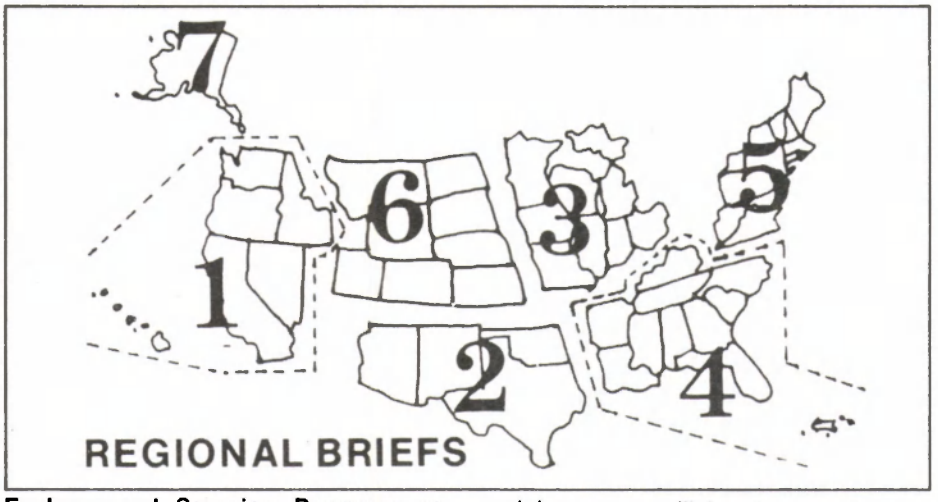
Working closely with the Recovery Team and the Service in the accomplishment of the recovery tasks are the States of Maryland, Virginia, and Delaware and the Audubon Naturalist Society, National Wildlife Federation, and The Nature Conservancy. The ultimate goal of the plan is the delisting of the eagle; a more immediate goal is to reclassify its status from Endangered to Threatened. The Recovery Team feels that, based on available habitat in the Chesapeake Bay Region, this reclassification can be accomplished when the eagle has reached a population size of 175–250 nesting pairs with a minimal productivity of 1.1 eaglets per active nest.

Further information on this plan can be obtained by contacting the Regional Director, U.S. Fish and Wildlife Service, Suite 700, One Gateway Center, Newton Corner, Massachusetts 02158 (617/965-5100). Copies of the plan are available from the Fish and Wildlife Reference Service, Unit i, 3840 York Street, Denver, Colorado 80250.

Mid-July Set for Joint Committee Meet

A Congressional Joint Committee, formed of members of both the U.S. House of Representatives and the U.S. Senate and their staffs, is scheduled to convene in mid-July. The joint committee will reconcile differences which exist between H.R. 6133 and S.2309, bills passed by the respective lawmaking bodies in early June 1982 for reauthorizing and further amending the Endangered Species Act. A complete analysis of the final 1982 Amendments of the Act will be given in a future issue of the BULLETIN.

Recent data show an increased number of bald eagle nests as well as increased nest productivity in the Chesapeake Bay area.



REGIONAL BRIEFS

Endangered Species Program regional staffers have reported the following activities for the month of June:

Region 1—In cooperation with the Oregon Department of Fish and Wildlife and the U.S. Forest Service, aerial surveys were conducted for active peregrine falcon *(Faico peregrinus)* eyries in Oregon. Most of the likely nesting sites were surveyed this year; the remaining areas will be done early next spring. Preliminary results indicate the possibility of two new active eyries. Only one active site is currently known.

The only currently known location of a candidate plant, palmate bird's beak *(Cordylanthus palmatus),* has been plowed by the landowner, indicating that conservation efforts to protect the site have failed. *C. palmatus* was thought to be extinct until recently rediscovered. The full impact that the plowing will have on this species is not yet known.

Over 13,000 cui-ui *(Chastmistes cujus)* have used the Pyramid Lake fishway at the Marble Bluff Dam on the Truckee River to gain access to upstream spawning areas. This is the largest run of this Endangered fish ever to enter the facility. The previous high was 7,100 in 1980. Fewer than a hundred entered the system last year. The success and magnitude of this year's run is due to high river inflows in Pyramid Lake and a new modified fish ladder in the Pyramid Lake fishway.

Region 2—The Endangered Gila topminnow *(Poeciliopsis occidentalis)* was stocked in over 70 springs and tanks on U.S. Forest Service lands during June. This action is part of a Memorandum of Understanding (MOU) with the Arizona Game and Fish Department, the Forest Service, and the Fish and Wildlife Service that potentially will lead to downlisting of the fish within 3 years and delisting within 5 years. It is believed to be the most extensive single reintroduction effort ever undertaken for a listed species, and estimates are that 250 people from the MOU cooperators participated in the recovery action.

The Arizona breeding population of the bald eagle *(Haliaeetus leucocephalus)* has fledged a near record 13 young from 7 nests. Three of these chicks were fostered at two nests, and all fledged successfully. To the east, bald eagles in Texas fledged 16 young from 14 nests.

About 2,000 Kemp's Ridley sea turtle *(Lepidochelys kempii)* eggs have been brought from the turtle's only known nesting beach (at Tamaulipas, Mexico) to the Padre Island National Seashore in Texas for incubation and imprinting. Following the hatchlings' imprinting on Padre Island beaches, they will be taken to the National Marine Fisheries Service laboratory at Galveston for "head-starting" prior to their eventual release.

Region 5—The Massachusetts bald eagle hacking program got off to a great start thanks to the State of Michigan, which donated two eagle chicks; the Massachusetts Audubon Society, which provided $10,000; and the Massachusetts Division of Fisheries and Wildlife, which planned, coordinated, and is carrying out the project at Ouabbin Reservoir. Region 3 of the Service was also thanked for its support of the cooperative venture.

The Forest Service has submitted a technical review draft of the Robbins Cinquefoil *(Potentilla robbinsiana)* Recovery Plan to the Regional Office. Another cooperative effort, the plan was prepared by the staff of the White Mountains National Forest (New Hamp-

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U.S. Fish and Wildlife Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the Virgin Islands. **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska.

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Rulemaking Actions — June 1982

Hawksbill Nesting Beaches Determined Critical Habitat

Important nesting beaches for the hawksbill sea turtle *(Eretmochelys imbricata)* in the Commonwealth of Puerto Rico have been determined Critical Habitat (F.R. 6/24/82). This action identifies specific areas subject to Federal agency consultation under Section 7 of the Endangered Species Act. Hawksbill populations throughout the tropics are jeopardized primarily by trade in turtle shells and products; taking of turtle eggs for human consumption and by predators; and disruption or alteration of nesting beaches. The maintenance and protection of undisturbed nesting beaches is necessary for the survival of hawksbills and other sea turtles, and this strategy was endorsed by the 1979 World Conference on Sea Turtle Conservation.

The hawksbill sea turtle was listed as Endangered in 1970. Since 1977, responsibility for the conservation of all listed sea turtles has been shared by the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS). The FWS has jurisdiction while they are on land; therefore, this determination applies only to nesting beach habitat. Included are all 7.2 kilometers of beaches on Isla Mona, along with sections of beachfront on Culebra Island, Isla Culebrita, and Cayo Norte, which are reported to be among the best in the world for the hawksbill. Some of these areas may also be used by other listed sea turtles, including the loggerhead *(Caretta caretta)*, green *(Chelonia mydas)*, and leatherback *(Dermochelys coriacea)*.

Regulatory History

Critical Habitat protection for hawksbill nesting beaches in the Commonwealth of Puerto Rico was first proposed on May 24, 1978, but was withdrawn March 6, 1979, because of changes in the requirements for determining Critical Habitat made by the 1978 Amendments to the Endangered Species Act. After complying with the new procedures, the rule was reproposed on October 22, 1980, and three public meetings were held in the area during the following December. Of the 25 comments received in response to the reproposal, 24 were in favor and one took no position. The area finally determined as Critical Habitat is essentially the same as that specified in the proposals.

Effects of the Rule

A Critical Habitat determination complements the protection already given a species at the time of its listing. It does not establish a refuge or wilderness area, but only assists Federal agencies in complying with their responsibilities under Section 7 of the Endangered Species Act. Specifically, Federal agencies are required to insure that any actions they fund, authorize, or carry out will not likely jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of its Critical Habitat. Maps and descriptions of the areas covered by the rule can be found in the June 24, 1982, *Federal Register.*

Photo by C. Kenneth Dodd

Pictured above is Isla Mona, Puerto Rico, part of the recently determined hawksbill sea turtle Critical Habitat.

Smoky Madtom Status Review

The smoky madtom *(Noturus baileyi)*, which was believed extinct until September 1980 when it was discovered by a Service survey crew in Citico Creek, Monroe County, Tennessee, is the subject of a status review (F.R. 6/22/82). This study will help to determine if the species and its habitat should be provided protection under the Endangered Species Act of 1973, as amended.

Citico Creek, a tributary of the Little Tennessee River, is presently the only known habitat of the smoky madtom. The fish was originally discovered by a Service crew in 1957 in Abrams Creek, another tributary of the Little Tennessee River in nearby Blount County. The discovery of the species and collection of the type specimens occurred during a "stream renovation" poisoning operation to remove unwanted fish species from the Chilhowee Reservoir watershed prior to closure of the Chilhowee Dam. (This was a routine procedure at that time designed to enhance the chances of establishing a trout fishery in a new reservoir.) Soon thereafter the Abrams Creek locality where the madtom was first discovered was flooded by the closure of Chilhowee Dam. Despite considerable efforts, no further specimens have been collected from Abrams Creek.

The biology of the madtom is poorly known. However, the fish are probably nocturnal and likely to feed on aquatic insects. Due to its apparent limited distribution, the fish is very vulnerable to a single catastrophic event which could completely eliminate the species. The fish's habitat could also be adversely modified by logging, road construction, or other disturbance within the Citico Creek watershed if these activities are not carefully designed and carried out with the welfare of the species in mind.

In addition to biological data, the Service is seeking information on environmental and economic impacts and effects on small entities that would result from listing the species as Endangered or Threatened under the Act. The Service also seeks information on possible alternatives to the listing.

Comments and data should be submitted to the Area Manager, U.S. Fish and Wildlife Service, 50 South French Broad Avenue, Plateau Building, Room A-5, Asheville, North Carolina 28801. For further information on the notice of review, write Mr. Richard Biggins or Mr. Robert Currie at the same address, or call (Commercial 704/258-2850, Extension 321; FTS 8/672-0321).

Return of Wolf Management to Minnesota Proposed

The return of management authority for the gray wolf *(Canis lupus)* in Minnesota to the State is included in new regulations recently proposed by the Service (F.R. 7/14/82). Among the provisions of the Minnesota management plan are increased flexibility in predator control and a limited trapping program.

The gray wolf once ranged through most of North America, but habitat loss and conflict with agricultural uses caused the extirpation of the species in most of the lower 48 States; the few remaining wolves in this region were later listed as Endangered. Today, the wolves in northern Minnesota compose the last large surviving population south of Canada. It was reclassified to "Threatened" in 1978. Current estimates are that it numbers 1,200–1,400 animals. A recovery plan for the eastern timber wolf, the subspecies of which the Minnesota wolves are a part, also was approved in 1978.

Although the reclassification to Threatened did allow for greater management flexibility with regard to predator control, problems continued in agricultural areas. Currently, the Service is restricted to trapping depredating wolves within one-quarter mile from where the incident occurred; the proposed regulations would extend the limit to one-half mile. Also, additional limited trapping would be allowed in certain areas, a measure which was recommended in 1978 by the recovery team. Restrictions would be imposed to maintain specified wolf population densities.

Under the proposed regulatory changes, the Minnesota wolves would continue to receive protection as Threatened under the Endangered Species Act, and all other gray wolves in the lower 48 States would remain Endangered. The species is still relatively secure in Canada and Alaska, where it is not listed.

The wolf proposal was prepared in the Service's Twin Cities Regional Office, and comments should be addressed to the Twin Cities Regional Director. Public meetings will be held in Minnesota at the Twin Cities Federal Building at 10:00 am on August 4 and at the Rainy River Community College in International Falls at 7:00 pm on August 11,1982. Comments are due by 9/13/82.

REGIONAL BRIEFS

Continued from Page 2

shire), with assistance from an advisory group of local conservation organizations, university personnel, and private citizens.

The Reynolds Research Center in Critz, Virginia, has provided emergency assistance in the Virginia roundleaf birch *(Betula uber)* recovery effort. The Center's facilities and technical expertise are being used to propagate about 10,000 seedlings which will be used to augment the wild population, which now has declined to only 15 individuals. (For more on the *B. uber* recovery effort, see the April 1982 BULLETIN.)

Region 6—The final report on the Yampa River Fishes Study was submitted to the National Park Service by the Colorado River Fisheries Study Team. Eight adult Colorado squawfish *(Ptychocheilus lucius)* implanted with radio-transmitters migrated in early July to spawning areas. This spawning migration had been postulated but never documented. The total distance moved by these fish during June and July ranged from 55 to 219 miles. Collections of young-of-the-year fish indicate a drift behavior whereby larvae drift downriver and away from the spawning site to more favorable quiet backwater habitats. Identification and protection of larval nursery areas and long distance spawning migrations of adult Colorado squawfish may be the most significant factors for preservation of this Endangered fish.

A few humpback chubs *(Gila cypha)* were collected, but no bonytail chubs *(Gila elegans)* were found, although they formerly occurred in the study area. A few razorback suckers *(Xyrauchen texanus)* were collected in spawning condition. Though spawning activities probably occurred, success of such attempts is doubtful since no young or juvenile razorback suckers were collected in 3 years of intensive sampling.

Since the fall of 1975, the Service has monitored the spring and fall migration of whooping cranes *(Grus americana)* between Wood Buffalo National Park and Aransas National Wildlife Refuge. A recent summary of these sightings by the Service's Pierre Area Office shows that 775 sightings have been reported. Using criteria developed by the Whooping Crane Recovery Team, 351 sightings were classified as "confirmed," 101 as "probable," and 323 as "unconfirmed." A total of 1,132 birds were reported in the 351 confirmed sightings. The number of birds per sighting ranged from 1 to 22, but most sightings were of 6 or less birds. The majority of the sightings were in Saskatchewan, Canada (52 percent), North Dakota (16 percent), Kansas (9 percent), and Nebraska (8 percent). Whoopers seem to migrate at a slower pace in the fall, resulting in 70 percent of the confirmed sightings being reported during fall migration. Since fall 1977, characteristics of many of the sites of confirmed sightings in the United States have been evaluated (e.g., vegetation, slope, water). These evaluations have contributed significant information toward determining the preferred loafing, feeding, and roosting habitats of the whooping crane. Fifty-three completed evaluations and the summary report are on file at the Pierre Area Office.

Proceedings of the Rocky Mountain Regional Rare Plant Conference, held in Denver in 1981 (see December 1981 BULLETIN), are available from the Endangered Species Office in the Service's Denver Regional Office.

Except for species known only from old collections, the rarest plant in Region 6 is the Maguire fleabane daisey *(Erigeron maguirei)* from central Utah. In 1980, only one plant was seen. This spring, a Service botanist, in an intensive search of the historic range, found only 7 plants. The canyons in which it occurs are impacted by grazing and off-road vehicle use. The region is proceeding toward listing it as Endangered.

Region 7—A preliminary report from the field crew aboard the vessel "Sea Spray" indicates that small numbers of Aleutian Canada geese *(Branta canadensis leucopareia)* have been sighted on Alaid-Nizki Islands in the western Aleutian chain. These islands were the site of last year's release of 357 Aleutian geese from the Patuxent and Northern Prairie Wildlife Research Centers. Through band identification, it has been confirmed that most of the geese are from last year's release effort. Some of the birds from this group have also been observed on nearby Agattu Island. More recently, 62 Aleutian geese were observed on the Islands of Four Mountains in the eastern Aleutians. As of June 23, it was not known whether any of the geese were attempting to nest. Buldir Island remains the only confirmed breeding colony but optimism is running high, since never before during the recovery effort have Aleutian geese been observed on so many islands.

A female American peregrine falcon banded as a nestling on the upper Yukon River of Alaska in 1979 was observed nesting at a Tanana River eyrie this summer by biologists Skip Ambrose and Michael Amaral. The distance between this bird's natal area and its nesting territory is approximately 130 miles. The sighting gives credence to the speculation that young from healthy populations (such as the Yukon River population) are recolonizing areas in other parts of the State where numbers of nesting pairs are still depressed.

Photo by Stephen E. Cornelius

An arribada at Playa Nancite. Hughes and Richard (1974) stated that this phenomenon "must rank as one of the most impressive examples of mass activity in the animal kingdom."

Researchers Study Little-Known Costa Rican Olive Ridleys

The olive ridley *(Lepidochelys olivacea),* which today is considered the most abundant of sea turtles, is widely distributed in the tropical coastal waters of the Pacific, Indian, and South Atlantic Oceans. Two Costa Rican beaches, Playa Nancite and Playa Ostional, together host the largest aggregation of these sea turtles in the world, receiving annually from 400 to 600 thousand olive ridley nestings.

The olive ridley has been consistently neglected and little is known about the factors which determine its distribution and movements. The species is least understood with regard to the reproductive stages of its life cycle. Until the 1960's it was believed that *L. olivacea,* unlike Kemp's ridley, nested singly—not in arribadas (or synchronous nesting activity). Since then, however, the species has been known to form arribadas in Mexico, Costa Rica, and India. How ridleys coordinate the mass nesting emergence and what precisely are the selective advantages of such a strategy are unclear.

In recent years, the arribada nesting phenomenon has been a key factor facilitating the mass destruction of some of the great ridley rookeries. The Mexican fleets which once represented the largest sea turtle aggregations have been decimated by over-exploitation. Populations on the coast of Orissa, India, are apparently undergoing the same destruction.

Until recently, ridleys nesting at Nancite and Ostional were considered reasonably secure, both because of the natural isolation of these nesting beaches, and because of the likelihood that the Costa Rican turtles were distinct from the Mexican populations. This sense of security was dashed, however, with the discovery of massive commercial harvests in Equador where some Costa Rican ridleys are known to migrate. The survival outlook for the species also was considerably altered when a tagged Costa Rican ridley was recovered in Mexican waters in 1981, opening the possibility that the Costa Rican fleets may, in fact, reach and mix with the over-harvested Mexican fleets. During the past 10 years, the size of arribadas at Nancite has remained approximately the same. Because of heavy and constant egg poaching, however, the size of arribadas at Ostional may have decreased by 30% during the past decade.

In August 1980, a long-term tagging program directed at gathering information on seasonal movements, fidelity to mass and solitary nesting strategies, and reproductive potential of individual olive ridleys was begun at Nancite and Ostional. This scientific investigation, which was continued in 1981, is the first to be conducted in Costa Rica since the initial work done in Nancite in the early 1970's by David Hughes, Joseph Richard, and Stephen Cornelius. Research during 1980 and 1981 was jointly sponsored by the University of Costa Rica (UCR), the Costa Rican National

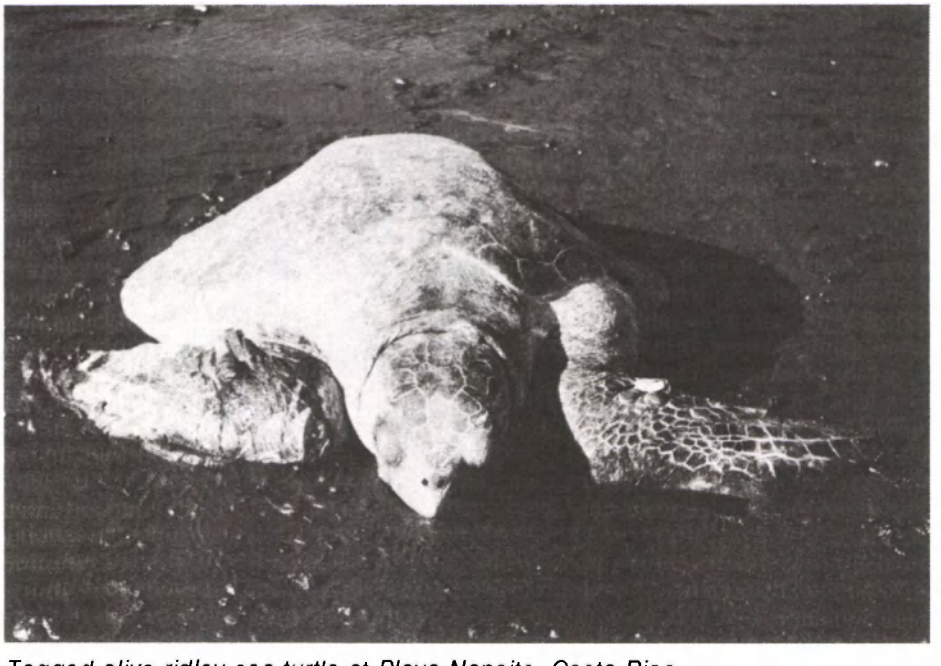

Photo by Jack B. Woody

Tagged olive ridley sea turtle at Playa Nancite, Costa Rica.

Park Service (CRNPS), and by the U.S. Fish and Wildlife Service. The research was coordinated by Douglas C. Robinson of UCR and by Stephen E. Cornelius, under contract to the Service.

After 2 years, the study has already provided significant new data which are central to the species' conservation and survival. The cooperative efforts of UCR students and CRNPS guards at Santa Rosa National Park have been crucial to the success of the study. Student stipends provided by World Wildlife Fund have also enhanced the program.

Study Sites

Because of their physical isolation and legislated protection within Costa Rican waters and because of the large numbers of turtles which continue to nest there, Nancite and Ostional hold great importance in the conservation of the ridley. Their importance to ridley reproduction was recognized at the World Conference on Sea Turtle Conservation (Washington, D.C., November 26–30, 1979). The resulting document "Sea Turtle Conservation Strategy," placed Nancite and Ostional second on the list of most critical sea turtle habitats worldwide.

Nancite, which is approximately 1075 m long, is located in Santa Rosa National Park in northwest Guanacaste Province. This nesting area has benefited greatly from over ten years of CRNPS protection. Ostional is located approximately 90 km south of Nancite and extends for approximately 800 m. Research at this beach continues to be hampered by poor relations with the local community, heavy poaching of eggs during arribadas, and confusion as to which government agency is responsible for the protection and management of the species and its habitat. A presidential decree signed in December 1981 specifically addressed some of these problems and will hopefully soon permit ridley studies there to expand in scope.

Arribadas Year-round

Local lore throughout the range of the olive ridley is surprisingly consistent, predicting that arribadas will happen during the last quarter moon accompanied by strong onshore winds and on a rising tide after nightfall. However, researchers have found it difficult to substantiate the association between these extrinsic factors and the actual emergence schedule on either beach.

Even though prior to 1981 arribadas had not been known to occur during the 5–6 month period between July and December, it was suspected for several years that mass nesting of olive ridleys occurred year-round. Last year, for the first time since the park was established in 1970, the Santa Rosa Park administration made is possible to station guards permanently at Nancite. The guards witnessed four arribadas during the dry season (December 1980–May 1981) as well as made valuable observations on interarribada nesting, hatchling emergence, predation, and weather events.

Tagging Operation and Results

Among the main objectives of the ongoing tagging operation is to mark large numbers of emerging female turtles, facilitating the study of seasonal movements, nesting periodicity, small group cohesiveness, mass nesting fidelity, and solitary nesting strategy. An important related activity is the registry of reobservations of turtles marked at the two beaches in 1980 and 1981, or earlier, to analyze the relative staying power and to note the general suitability of two different tag types which have been used for marking.

Tagging followed a prescribed schedule which allocated blocks of tags according to temporal, spatial, and behavioral aspects of the nesting season at both beaches. Monel metal tags as well as colored plastic tags were used both years. Currently, the tagged Costa Rican population is approximately 30,100, of which 20,360 carry a single metal tag, 6,170 a single plastic tag, and 3,570 which were double tagged with one of each type. Both plastic and metal tags were lost at a greater rate than expected.

In 1981, 22 tagged ridleys were reobserved outside Costa Rican waters. Nearly all countries between Equador and Mexico were represented in this count: 11 from Equador, 4 from Guatemala, 2 from El Salvador, and 1 each from Colombia, Panama, Nicaragua, and Mexico. One turtle was recovered from an oceanic location approximately 2,100 km due west of Costa Rica. Nearly 80% of all distant reobservations have come as a result of incidental catches by commercial fisheries (shrimp, shark, tuna). The remainder were returned by turtle fishermen (15%) and researchers (6%).

Photo by Stephen E. Cornelius

An arribada under sunset.

Population Estimates

Until recently, estimates of female ridleys involved in arribadas have been based mainly on the experience of the various observers—on the person's perception of what 3,000 turtles should look like on 1 km of beach. No matter how accomplished an individual becomes at making such estimates, it remains a very inaccurate method by which to measure the absolute size of the nesting population.

The critical need for more precise information regarding the reproductive effort of the olive ridley is pointed out by the magnitude of actual counts of ridleys taken by heavy commercial harvest in the east Pacific. These harvest counts offer hard data, actual counts of turtles captured, and are an *ex post facto* estimate of a population in distress.

For the past several years, the quadrat method has been used to estimate the number of female ridleys participating in arribadas. This is a very general method that is actually a true census (a total count) but only of a representative portion of the beach. In 1980 and before, there was some question as to how best to interpret the data generated by quadrat counts since there was little or no information for many associated variables, i.e. rate of multiple emergence, time on the beach, and size of the available nesting beach.

Considerable efforts were made in 1981 to improve the quadrat count system. Census quadrats of 100 m were established in the mid beach zone at Nancite. A formula based on quadrat counts and corrected for all of the variables mentioned above was used to estimate the size of the nesting population. As more data become available for the numerous variables, the formula will be refined. The researchers feel that the formula applied to quadrat counts is an important step towards the goal of estimating the total population.

Sizes of the major arribadas at Nancite in 1981 were placed at 50,000 (August), 108,000 (September), 110,000 (October), 72,000 (November), and 18,000 (December). These estimates were compared to other calculations based on post-arribada nest density and the reobservation rate of tagged turtles. Calculations in 1981 indicate that the population probably totals 220,000 to 550,000 adult females.

Hatching Success

Hatchling emergence was quantitatively measured by V-shaped drift fence traps located at five locations in the mid beach zone. Trap wings were set at an angle of 135° and permitted an estimated capture efficiency of 100% for nests opening within 6 meters to 5% for those opening 20 meters or more from the trap.

Individual nests were marked at the time of laying with a short piece of numbered garden hose attached to a 20–40 cm long wooden stake. The stake was buried 1m distant from the nest, and a colored plastic flagging bearing the number of the nest was placed on top of the clutch just before the turtle filled the cavity. Reappearance of the flagging during a subsequent arribada indicated that the nest was at least partially destroyed by another nesting turtle. In the same manner, a predated marked nest resulted in the ribbon appearing at the surface near the nest site. At 45 days, a hardware cloth rectangular basket was placed over the nest, leaving room for the hatchlings to emerge and be counted. Towards the end of the incubation periods (about 50 days) the nest was opened and numbers of live and moribund hatchlings left in the nest were determined.

Photo by Stephen E. Cornelius

An olive ridley hatchling.

The researchers have estimated that during an average wet season arribada 45% of the clutches are physically disrupted by predation, beach erosion, and from nesting turtles during the same or subsequent arribadas. Of the remaining clutches that survive intact to term, 93% are lost to microorganisms and possible microenvironmental unbalances at various stages of development. Of the 3% of the original clutches in which some successful hatching and emergence occurs, 75% of the eggs fail to develop to term or hatchlings die in the nest. The result of these calculations is the live hatch of 94,000 hatchlings from an arribada of 100,000 clutches averaging 106 eggs each—a hatching success rate of 0.89%.

Some of the factors listed are involved in determining hatching success at other beaches and with other sea turtle species. Conspicuous to Nancite is the extraordinary number of entire clutches which show no embryological development or which stop development at various stages before full-term incubation. A preliminary study has been undertaken by UCR to determine what microorganisms are present in the beach environment which could be possible causes for the low-hatching success.

Photo by Stephen E. Cornelius

A 1 meter square excavation dug 40 cm into the beach at Nancite showing a nest density of 9/m_2, all of which contained nonviable eggs.

Future Plans

Next year's plans include the continuation of both the tagging operation and of movement and distribution studies. The latter will be supplemented by a study of surface currents which hopefully will provide new information about adult and hatchling olive ridley movements. Plans are also underway to establish a regional olive ridley program which would involve all countries where the species occurs.

New Publications

Endangered and Threatened Wildlife of the Chesapeake Bay Region: Delaware, Maryland, and Virginia by Christopher P. White is now available for $5.50. This field guide documents the status, description, habitat, behavior, and distribution of each of 41 federally protected animals and plants classified as Endangered or Threatened in the Chesapeake Bay region. The 4½″ × 7″ volume has 160 pages and is illustrated with full-color photographs and paintings, and distribution maps. It was published as a cooperative project supported by the Chesapeake Bay Foundation and the U.S. Fish and Wildlife Service. Order [#0-87033-287-2] from Tidewater Publishers, P.O. Box 456, Centreville, Maryland 21617.

Phases I–IV of the U.S. Fish and Wildlife Service sponsored Kellert reports on public attitudes toward wildlife are now available through the Government Printing Office (GPO). Copies may be ordered by calling the GPO Order Desk at 202/783-3238, giving the name and stock number of the report, and VISA or Master Charge card number; or by writing to the U.S. Government Printing Office, Superintendent of Documents: S.S.M.C., Washington, D.C. 20402, giving the same information as above, and enclosing a check made out to GPO.

The GPO stock numbers and prices for the four publications are: Kellert, Stephen R., "Phase I—Public Attitudes Toward Critical Wildlife and Natural Habitat Issues," #024-010-00-623-4, $6.50; Kellert, Stephen R., "Phase II—Activities of the American Public Relating to Animals," #024-010-00-624-2, $7.00; Kellert, Stephen R. and Joyce K. Berry, "Phase III—Knowledge, Affection and Basic Attitudes Toward Animals in American Society," #024-010-00-625-1, $6.50; and Kellert, Stephen R. and Miriam O. Westervelt, "Phase IV—Trends in Animal Use and Perception in 20th Century America," #024-010-006-21-8, $7.00.

The University Presses of Florida in cooperation with the State of Florida Game and Fresh Water Fish Commission have announced the availability of the sixth volume in the series, *Rare and Endangered Biota of Florida,* Peter C. H. Pritchard, general editor. Volume VI, *Invertebrates,* edited by Richard Franz is now available for $7.50. The other volumes are available at the following prices: Volume I—Mammals, at $5.00; Volume II—Birds, at $7.00; Volume III—Amphibians and Reptiles, at $5.50; Volume IV—Fishes, at $5.00; and Volume V—Plants, at $10.50. They are now all available from the University Presses of Florida, 15 Northwest 15th Street, Gainesville, Florida 32603.

A cumulative index of the *Endangered Species Technical Bulletin* (July 1976—December 1981) is now available. Copies may be requested by writing the Office of Endangered Species, U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240.

The *U.S. List of Endangered and Threatened Wildlife and Plants* (50 CFR 17.11 and 17.12), reprinted January 1, 1982, is now available. Please request copies from the Office of Public Affairs—Publications, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

BOX SCORE OF SPECIES LISTINGS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL
Mammals	15	17	224	3	0	21	281
Birds	52	14	144	3	0	0	213
Reptiles	7	6	55	8	4	0	80
Amphibians	5	0	8	3	0	0	16
Fishes	28	4	11	12	0	0	55
Snails	3	0	1	5	0	0	9
Clams	23	0	2	0	0	0	25
Crustaceans	2	0	0	0	0	0	2
Insects	7	0	0	4	2	0	13
Plants	52	2	0	7	1	2	64
TOTAL	194	43	445	45	7	24	758

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, and Olive ridley sea turtle.

Number of species currently proposed: 10 animals
8 plants
Number of Critical Habitats listed: 51
Number of Recovery Teams appointed: 69
Number of Recovery Plans approved: 54
Number of Cooperative Agreements signed with States:
38 fish & wildlife
11 plants

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ENDANGERED SPECIES

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Endangered Species Program, Washington, D.C. 20240

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